Assignment 8: From GANs to WGANs

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Part A: Vanilla GAN

1. Loss Curves - Vanilla GAN

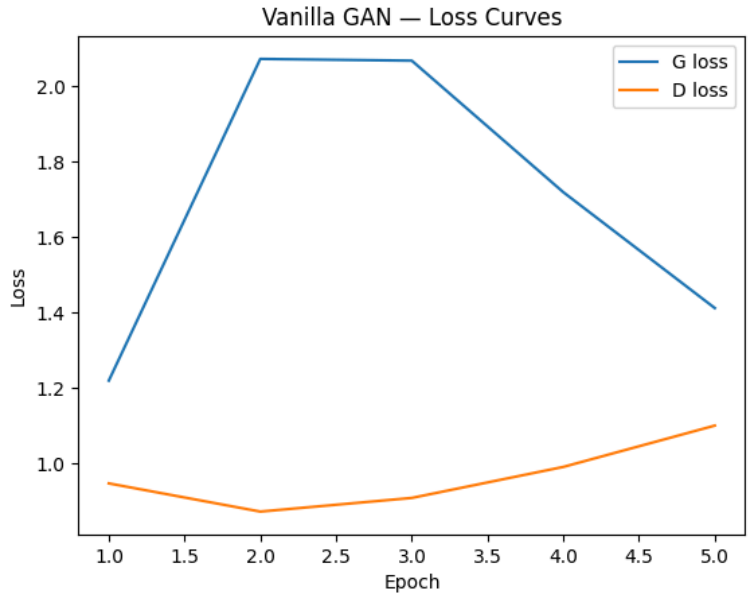

Figure 1: Training loss curves for Vanilla GAN over 5 epochs. Blue line shows Generator loss, orange line shows Discriminator loss.

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2. Generated Samples - Vanilla GAN (After 5 Epochs)

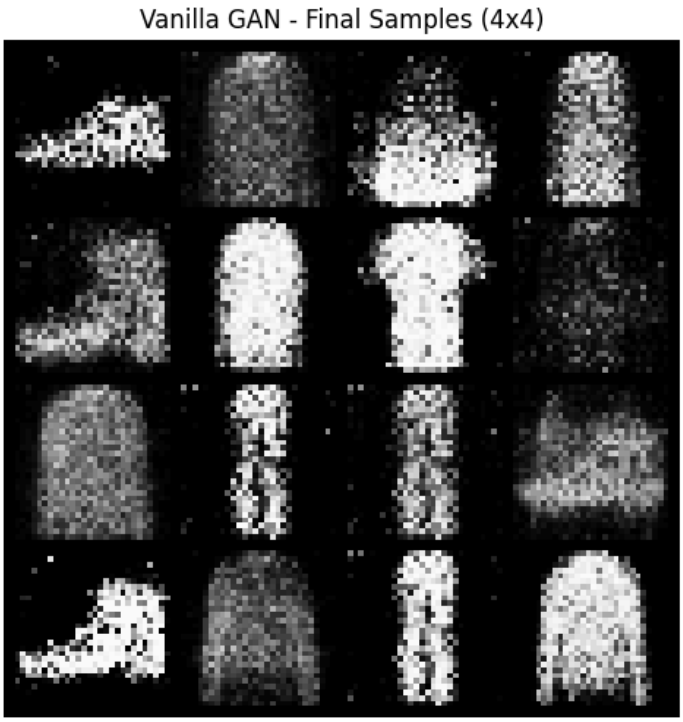

Figure 2: 16 samples generated by Vanilla GAN after 5 epochs of training on FashionMNIST.

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3. Analysis - Vanilla GAN (A.2)

Question: What problems do you observe in the generated outputs or loss curves?

The loss curves show significant instability with Generator loss spiking to 2.1 before decreasing. Generated samples exhibit limited diversity with repeated patterns and noisy outputs, indicating mode collapse and unstable training dynamics.

Part B: Wasserstein GAN with Gradient Penalty

4. Loss Curves - WGAN-GP

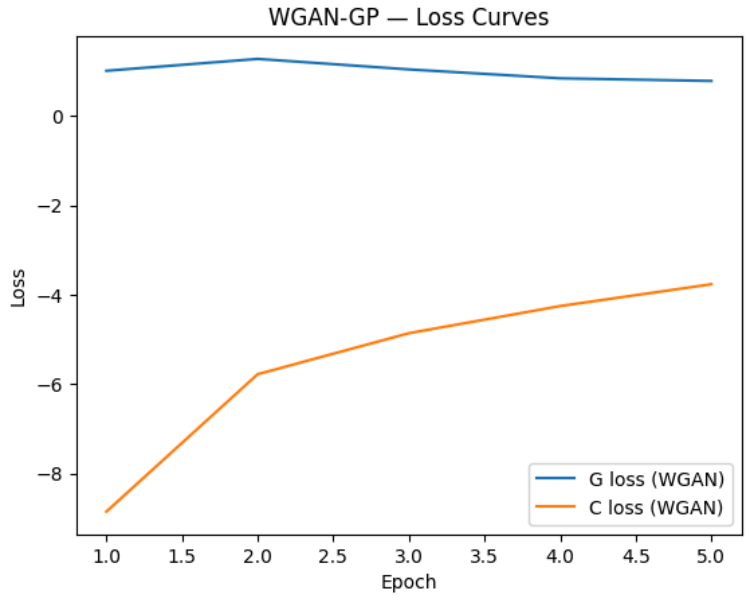

Figure 3: Training loss curves for WGAN-GP over 5 epochs. Blue line shows Generator loss, orange line shows Critic loss.

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5. Generated Samples - WGAN-GP (After 5 Epochs)

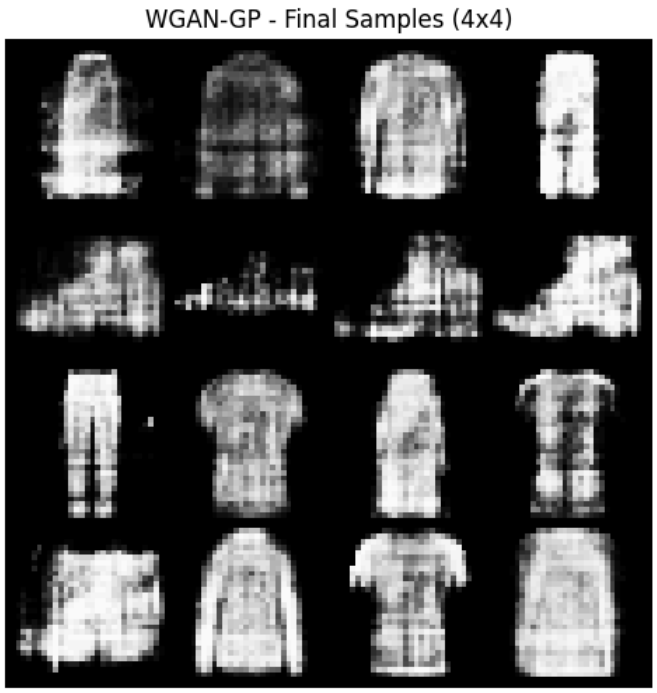

Figure 4: 16 samples generated by WGAN-GP after 5 epochs of training on FashionMNIST.

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6. Analysis - WGAN-GP (B.5)

Question: How do the training behaviour and image quality differ from the vanilla GAN?

WGAN-GP demonstrates significantly more stable training with smooth, monotonic loss convergence. Generated images show clear clothing structures with better diversity and much less noise compared to vanilla GAN, validating the effectiveness of Wasserstein distance with gradient penalty.
